UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,684	07/31/2003	Magdy Salama	2929-0223P	7661

7590 04/16/2008

Honeywell International Inc.
Law Dept. AB 2
P.O. Box 2245
Morristown, NJ 07962-9806

EXAMINER	
LAXTON, GARY L	
ART UNIT	PAPER NUMBER
2838	
MAIL DATE	DELIVERY MODE
04/16/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAGDY SALAMA, MEHRDAD KAZERANI,
and CHUN HO LAM

Appeal 2008-0878
Application 10/630,684
Technology Center 2800

Decided: April 16, 2008

Before JOSEPH F. RUGGIERO, JOHN A. JEFFERY, and KEVIN F. TURNER, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 1-31.[1] We have jurisdiction under 35 U.S.C. § 6(b). We affirm-in-part.

---

[1] Appellants waived attendance at an oral hearing scheduled for April 10, 2008. *See* Communication filed March 11, 2008.

STATEMENT OF THE CASE

Appellants invented a high-voltage power supply which includes a voltage multiplier that receives a high-frequency wave and performs successive voltage doubling operations to generate a high-voltage DC output.[2] Claim 1 is illustrative:

1. A high-voltage power supply, comprising:

a power scaling section receiving an input voltage signal and converting said input voltage signal to a controllable DC voltage;

a push-pull converter for converting said controllable DC voltage to a high-frequency wave; and

a voltage multiplier receiving said high-frequency wave generated by said push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output, the generated high-voltage DC output being varied as said controllable DC voltage varies.

The Examiner relies on the following prior art references to show unpatentability:

Shelly	US 4,251,857	Feb. 17, 1981
Gallios	US 4,893,227	Jan. 9, 1990
Adasko	US 5,414,224	May 9, 1995
Gak	US 6,141,225	Oct. 31, 2000

1. Claims 1, 7-12, 18-22, and 24-31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Shelly and Gallios.

[2] *See generally* Abstract; Spec. ¶ 0004.

2. Claims 2-6 and 23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Shelly, Gallios, and Gak.
3. Claims 13-17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Shelly, Gallios, and Adasko.[3]

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs and the Answer for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments which Appellants could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

OPINION

We first consider the Examiner's obviousness rejection of claims 1, 7-12, 18-22, and 24-31 over the disclosures of Shelly and Gallios. In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the Examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

[3] Although the Examiner includes additional grounds of rejection as an alternative basis for these rejections (Ans. 9-14), these rejections are based on the same combination of references noted above. As these rejections merely reflect the collective teachings of the same references and are not dispositive to our decision, we therefore rely solely on the above rejections in this opinion.

Discussing the question of obviousness of a patent that claims a combination of known elements, the Court in *KSR Int'l v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007) explains:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* [*v. AG Pro, Inc.,* 425 U.S. 273 (1976)] and *Anderson's-Black Rock*[*, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969)] are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

KSR, 127 S. Ct. at 1740. If the claimed subject matter cannot be fairly characterized as involving the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding of obviousness can be based on a showing that "there was an apparent reason to combine the known elements in the fashion claimed." *Id.* at 1740-41. Such a showing requires "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a

person of ordinary skill in the art would employ." *Id.* at 1741 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

If the Examiner's burden is met, the burden then shifts to the Appellants to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

The Examiner's rejection essentially finds that Shelly teaches a high-voltage power supply with every claimed feature except for the recited voltage multiplier as well as the recited output voltages and frequency of the high frequency (HF) wave. The Examiner, however, cites Gallios as teaching these features and concludes that the claimed invention would have been obvious to one of ordinary skill in the art at the time of the invention in view of these collective teachings (Ans. 3-7).

Independent Claim 31

Regarding independent claim 31, Appellants argue that the portion of Gallios cited by the Examiner refers to switching the frequency of transistors in a power stage 20 that includes a transformer, not the frequency of wave output by a push-pull converter to a voltage multiplier stage that performs successive voltage doubling operations as claimed. Appellants add that modifying Shelly to incorporate a voltage multiplier with successive voltage operations would ostensibly require at least a significant redesign of the power conversion elements. Moreover, Appellants contend, modifying Shelly's power supply in the manner asserted by the Examiner would render the current sensing arrangement unsuitable for its intended purpose, namely to compensate for load-induced output voltage fluctuations by generating a current varying in proportion to such voltage fluctuations (App. Br. 7-9).

The Examiner maintains that Gallios discloses the recited HF wave output from the push-pull inverter to the voltage multiplier. According to the Examiner, the switches (transistors) drive the transformer to therefore create the output wave from the transformer (Ans. 16-17).

At the outset, we note that Appellants do not dispute the Examiner's findings with respect to the disclosure of Shelly. Nor do Appellants dispute the Examiner's findings with respect to the high voltage multiplier 20 of Gallios. The issues before us, then, are (1) whether modifying Shelly in the manner proposed by the Examiner (i.e., including a voltage multiplier) would render Shelly unsuitable for its intended purpose, and (2) whether such a combination teaches or suggests all recited limitations. For the

following reasons, we answer "no" to the first question, and "yes" to the second question.

Shelly discloses a power supply circuit with a DC-DC chopper-converter section 10 and a DC-DC inverter-converter section 12. A key feature of Shelly's circuit is that it compensates for variations in the power supply's output voltage due to variations in output loading. To this end, a compensation network 14 is provided with an impedance that is equivalent to the power supply's output impedance. Thus, variations in the output loading will cause corresponding proportional changes in the currents passing through the load and compensating network. This changing current in the compensation network generates a corresponding changing voltage which is coupled as a feedback signal to the power supply's chopping transistor to provide the compensation. By providing such a current sensing circuit 14 on the input side of the coupling transformer T_1, there is no need for voltage or current feedback from the output side of the coupling transformer (Shelly, Abstract; col. 2, ll. 2-14; Fig. 1).

Gallios discloses a high voltage power supply which provides alternate polarity energy pulses to a load. The main power stage includes an output transformer T10, control switches Q10, Q11, and a two-stage full-wave Cockroff-Walton high voltage multiplier 20 connected to the secondary of the transformer. As shown in Figure 1, the high voltage multiplier is a circuit consisting of AC and DC capacitors and diodes (Gallios, col. 6, ll. 4-26; Fig. 1).

Based on this functionality, we agree with the Examiner (Ans. 18) that since the voltage multiplier in Gallios is merely a passive circuit connected to the secondary of a transformer as shown in Figure 1, we see no reason why skilled artisans could not have connected such a passive multiplier circuit to the transformer secondary of Shelly to obtain desired voltage multiplication of the output voltage. Furthermore, we find the Examiner's point regarding replacing the rectifier in Shelly with a voltage multiplier circuit to be well taken, particularly in view of Gallios' alternative embodiment of Figure 5 which shows connecting a full-wave rectifier circuit on the secondary side of the transformer in lieu of a voltage multiplier as shown in Figure 1. *Compare* Fig. 1 of Gallios *with* Fig. 5. *See also* Gallios, col. 4, ll. 35-38. We also agree with the Examiner (Ans. 16) that an HF wave in Gallios is generated ultimately by the switching transistors that drive the transformer.

We disagree with Appellants (App. Br. 9; Reply Br. 4) that such a modification would render Shelly's current sensing circuit 14 (i.e., the compensation circuit) unsuitable for its intended purpose or significantly diminish the effectiveness of Shelly's voltage regulation scheme. Not only have Appellants provided no evidence on this record to support these assertions, we see no reason why the compensation circuit could not operate similarly with or without a voltage multiplication circuit. As Shelly indicates, it is the variations in output loading which cause corresponding changes in the currents passing through the load and the compensating network (Shelly, Abstract). We see no reason why such output loading

fluctuations (and concomitant changes in current in the compensation circuit) would not likewise be present in such a circuit with a voltage multiplier.

In short, Appellants have not persuasively rebutted the Examiner's position that adding such a voltage multiplier to Shelly's circuit would provide, at the very least, voltage multiplication – a result that would have been predictable to ordinarily skilled artisans – and yet retain its compensation capabilities. To the extent that this modification constitutes a "redesign," such a modification, in our view, would nevertheless have been well within the level of ordinarily skilled artisans and tantamount to the predictable use of prior art elements according to their established functions – an obvious improvement. *See KSR*, 127 S. Ct. at 1740.

For the foregoing reasons, we will sustain the Examiner's rejection of independent claim 31.

Claims 1, 8-12, 18-22, and 25-30

Regarding representative independent claim 1,[4] Appellants essentially reiterate their arguments with respect to claim 31, but also dispute the Examiner's assertion that Shelly's DC-DC inverter/converter outputs a high-frequency wave, particularly in view of the term "high frequency" as interpreted by skilled artisans in light of the Specification (App. Br. 10).

At the outset, our previous discussion with respect to independent claim 31 applies equally here and we therefore incorporate that discussion by reference. In addition, as the Examiner indicates (Ans. 19), Appellants have not specifically defined the term "high frequency" in the Specification; therefore, the term is given its broadest reasonable interpretation. Given the

---

[4] Appellants argue independent claim 1, but do not separately argue dependent claims 8-12. *See* App. Br. 9-10. Furthermore, although Appellants independently treat independent claim 18 in the Appeal Brief (App. Br. 11), Appellants do not separately argue this claim with particularity, but merely indicate that the arguments made with respect to claim 1 likewise apply to this claim. Accordingly, we treat claims 1, 8-12, 18-22, and 25-30 as a group and select claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

We note in passing that although the Examiner included claim 12 in the rejection of claim 1 based on Shelly and Gallios (Ans. 3-4), claim 12 *depends on claim 2* which was rejected over Shelly, Gallios, and Gak (Ans. 7). Although the Examiner should have included the rejection of claim 12 in the rejected claim grouping comprising claims 2-6 and 23, Appellants did not argue this defect. Moreover, based on the record before us, we consider this error harmless since, among other things, the Examiner addressed the limitation of claim 12 in the rejection. *See* Ans., at 4 ("The control module is an analog controller."). Therefore, we will sustain the Examiner's rejection of claim 12.

broad scope of the term, we find the Examiner's reliance on Shelly and Gallios for this limitation (Ans. 19-20) reasonable.

Therefore, we will sustain the Examiner's rejection of representative claim 1 and claims 8-11, 18-22, and 25-30 which fall with claim 1.

Claims 7 and 24

We will also sustain the Examiner's rejection of claims 7 and 24 essentially for the reasons noted above and for the reasons indicated by the Examiner (Ans. 20). As the Examiner indicates, Shelly shows that "square waves" are generated for a number of various electrical currents in Figure 2, including the secondary winding currents i_9 and i_{10}. Although the waveforms for currents i_9 and i_{10} in Shelly may not represent an ideal square wave (as is the case for nearly all of the other current waveforms shown in Figure 2), the waveforms for currents i_9 and i_{10} nonetheless have substantial square wave components which fully meet the term "square wave" giving the term its broadest reasonable interpretation. Therefore, we will sustain the Examiner's rejection of claims 7 and 24.

Claims 2-6 and 23

Regarding the Examiner's obviousness rejection of claims 2-6 and 23 over the disclosures of Shelly, Gallios, and Gak, we find that the Examiner has established at least a prima facie case of obviousness of those claims that Appellants have not persuasively rebutted. Specifically, the Examiner has (1) pointed out the teachings of Shelly and Gallios, (2) noted the perceived

differences between these references and the claimed invention, and (3) reasonably indicated how and why they would have been modified to arrive at the claimed invention (Ans. 7-8). Once the Examiner has satisfied the burden of presenting a prima facie case of obviousness, the burden then shifts to Appellants to present evidence and/or arguments that persuasively rebut the Examiner's prima facie case. Appellants did not specifically show error in the Examiner's findings or analysis to persuasively rebut the Examiner's prima facie case of obviousness, but merely noted that the addition of Gak fails to cure the deficiencies of Shelly and Gallios in connection with the independent claims (App. Br. 12). The rejection is therefore sustained.

The Obviousness Rejection Over Shelly, Gallios, and Adasko

We now consider the Examiner's obviousness rejection of claims 13-17 over the disclosures of Shelly, Gallios, and Adasko.

Claims 13-15

Regarding claim 14, Appellants argue that while Adasko's printed circuit board includes an insulation layer, the reference fails to teach the recited multi-layer system of insulation layers and strips positioned therebetween (App. Br. 14).

We agree with the Examiner (Ans. 21) that Adasko at least teaches that known printed circuit boards comprise the alternating multilayer arrangement as claimed. We add that nothing in the claim precludes an

arrangement such as that disclosed by Adasko which discloses an "insulating coat" (a first insulation layer) on a metal base and an overlying "insulating layer" with a first layer comprising metal tracks therebetween (Adasko, col. 1, ll. 42-55). Moreover, we see no reason why electronic circuitry of the Shelly/Gallios device could not be mounted on a printed circuit board to, among other things, reduce the size of the circuit layout and minimize wiring.

Therefore, we will sustain the Examiner's rejection of claim 14 and claims 13 and 15 which were not separately argued.

Claim 16

We will not, however, sustain the Examiner's rejection of claim 16. At the outset, we agree with the Examiner (Ans. 21-22) that ordinarily skilled artisans could have reasonably (1) integrated the various components of each stage of Gallios' multiplier onto a separate circuit board, and (2) duplicated the number of integrated stages to generate the appropriate multiplication factor as desired. These modifications would have merely been predictable variations or applications of known techniques to known prior art elements that are ready for the improvement. *See KSR*, 127 S. Ct. at 1740-41.

However, we disagree with the Examiner that skilled artisans would have known to separate the voltage doubler stages among the various circuit boards from the power scaling section and the push-pull converter, as claimed. Apart from a mere statement that "constructing a formerly integral

structure in various elements involves only routine skill in the art," the Examiner has not provided evidentiary support for such an assertion. Absent any evidence on this record teaching or suggesting such an arrangement, such a modification, in our view, is tantamount to hindsight reconstruction of the invention.

Therefore, we will not sustain the Examiner's rejection of claim 16.

Claim 17

We will also not sustain the Examiner's rejection of claim 17. We disagree with the Examiner's assertion (Ans. 23) that a "Cockroff-Walton multiplier comprises capacitors arranged in a non-parallel configuration and connected in substantially the same way" as the claimed invention. There is simply no evidentiary basis on this record to teach or suggest that the capacitors in the prior art multiplier are arranged in a non-parallel, diverging pattern as claimed – a zig-zag pattern such as that shown in Figure 9 that, according to the Specification, improves heat dissipation and enables more capacitors to be mounted in a given area (Spec. ¶ 0035).

Therefore, we will not sustain the Examiner's rejection of claim 17.

DECISION

We have sustained the Examiner's rejections with respect to claims 1-15 and 18-31. We have not, however, sustained the Examiner's rejections of claims 16 and 17. Therefore, the Examiner's decision rejecting claims 1-31 is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

tdl

Honeywell International Inc.
Law Dept. AB 2
P.O. Box 2245
Morristown NJ 07962-9806